

72-11-72

# An Announcement of Highway Safety Literature ... A Bi-Monthly Abstract Journal



HSL No. 72-11  
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**THIS ISSUE CONTAINS:**

HS-011 019 - HS-011 083  
HS-800 504, 561, 563 - 564  
HS-800 607 - 612, 621, 639 & 660  
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*U.S. Department of Transportation / National Highway Traffic Safety Administration*

660-1

HSL No. 72-11 June 9, 1972 HS-011 019 - HS-011 083, HS-800 504, 561, 563 - 564, 607 - 612, 621, 639 & 660  
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NOTE: ( ) Numbers in parentheses following certain subject groups indicate the Highway Safety Program Standards (No. 1, and up) and/or Federal Motor Vehicle Safety Standards (No. 101 and up) which may apply to these groups.

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NOTE: Material published in Highway Safety Literature (HSL) is intended for the information and assistance of the motor vehicle and highway safety community. While brand names, equipment model names and identification, and companies may be mentioned from time to time, this data is included as an information service. Inclusion of this information in the HSL should not, under any circumstances, be construed as an endorsement or an approval of any particular product, course, or equipment by the U.S. Department of Transportation, National Highway Traffic Safety Administration.

Harry A. Feinberg  
Managing Editor

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GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Give corporate author, title, personal author, and report number. Prepayment is required by GPO coupon (NTIS coupons are not acceptable), check or money order (made payable to the Superintendent of Documents).

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418.

NHTSA: National Highway Traffic Safety Administration, General Services Division, Washington, D.C. 20591 (Telephone (202) 426-0874), Give HS-No.

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. Order by SAE report numbers. Prices given are list; discounts are available to SAE members and sometimes to libraries and U.S. Government Agencies. Prepayment is required; orders received without payment are subject to a \$1 handling charge.

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## 1/0 ACCIDENTS

### 1/1 Emergency Services

HS-011 019 Fld. 1/1

#### FLASH: A DISABLED VEHICLE DETECTION SYSTEM

by Charles J. Meiselbach; Ivor S. Wise-part; H. Rudolph Inhelder; Raleigh H. Emery

Published in *IEEE Transactions on Vehicular Technology* vVT-19 n1 p82-9 (Feb 1970)

7refs

The Flash Lights and Send Help (FLASH) system uses an electro-optical detector designed to enable passing drivers to conveniently summon assistance for motorists in distress. The concept, design and mechanical construction of the system are discussed in relation to the technical fulfillment of practical operational requirements. A detector knockdown alarm, system test mode, and an audio alarm are incorporated on an illuminated road-status display panel located at the central monitoring station. A prototype system is presently being installed on a 50-mile section of Interstate 4 between Tampa and Orlando in Florida, and will be operated by Florida highway patrol during a one-year evaluation period.

Search terms: Disabled vehicles; Flashing lamps; Driver aid systems; Flash Lights and Send Help Program; Optical detectors; Headlamp usage

### 1/5 Statistical data

HS-011 020 Fld. 1/5; 1/3

#### THE DEGREE OF INFLUENCE OF CERTAIN FACTORS PERTAINING TO THE VEHICLE AND THE PAVEMENT ON TRAFFIC ACCIDENTS UNDER WET CONDITIONS

by Kenneth D. Hankins; Richard B. Morgan; Bashar Ashkar; Paul R. Tutti

Texas Hwy. Dept.

1970 59p 7refs

Report no. 133-3F; PB-201 151

Some 500 wet weather accidents were studied and data collected on several vehicle, pavement, and weather variables. In order of importance, lack of pavement texture, worn tires, low surface friction, high vehicle speeds, and high vehicle tire pressures were dominant in the accidents studied. It is recommended that ways to obtain better texture should be considered in highway design, construction, and maintenance; that sufficient surface friction should be maintained, as by using a non-polishing aggregate; that driving speeds in wet weather should be reduced; and that minimum tread depths should be required on tires.

Search terms: Tire inflation pressure; Wet road conditions; Skidding accidents; Pavement skid resistance; Accident factors; Variables; Texas; Accident studies; Pavement skidding characteristics; Pavement surface texture; Accident types; Accident causes; Environmental factors; Wet skidding; Tire treads; Tire wear; High speed caused accidents; Weather caused accidents; Accident statistics

AVAILABILITY: NTIS as PB-201 151

HS-011 021 Fld. 1/5; 5/3

#### A MOTORCYCLE ACCIDENT STUDY

California Dept. of Hwy. Patrol

1968 88p

This special study of 951 fatal and injury motorcycle accidents was made over a 46-day period in 1967, since routine statistics were inadequate. From 1961 through 1966, motorcycle registration increased 261% and accidents 232%,

while other vehicle registrations increased 27%, accidents 37%. Motorcycle involvement in fatalities and injuries is higher per vehicle, but operators are less often considered at fault and had less often been drinking. Only 17% of the motorcycles in the study had windshields or crash bars, and only 25% of the drivers were wearing helmets; 20% of the drivers wore inadequate footwear. Women accounted for less than 4% of the motorcycle drivers but 44% of the passengers. Age factors, type of driver license, and environmental factors are discussed.

Search terms: Motorcycle accidents; Drinking drivers; Motorcycle safety; Motorcycle operator fatalities; Footwear; Accident statistics; Accident factors; Helmets; Accident location; California; Motorcycle operator injuries; Driver experience; Day of week; Female drivers; Age factor in accidents; Sex factor in accidents; Driver licensing; Environmental factors; Accident responsibility; Accident rates; Injury rates; Head injuries; Foot injuries; Occupant protection.

## 2/0 HIGHWAY SAFETY

HS-011 022 Fld. 2/0

#### A BIBLIOGRAPHY OF UNIVERSITY OF MICHIGAN PUBLICATIONS ON HIGHWAY SAFETY SINCE THE ESTABLISHMENT OF THE HIGHWAY SAFETY RESEARCH INSTITUTE, DECEMBER 17, 1965

by Kathleen Weber

Michigan Univ. Hwy. Safety Res. Inst.

1971 44p refs

Publications of the Highway Safety Research Institute are listed by subject: general highway safety; alcohol research; biosciences; human factors; physical factors; systems analysis; and transportation studies. Publications of other divisions of the university are listed by school or laboratory.

## 2/0 Highway Safety (Cont'd.)

HS-011 022 (Cont'd.)

Search terms: Bibliographies; Highway safety; Sociological factors; Legal factors; Drinking drivers; Problem drivers; Alcoholism; Transportation studies; Biology; Impact tolerances; Human factors; Biomechanics; Injury research; Occupant protection; Environmental factors; Systems analysis

## 2/1 Breakaway Structures

HS-011 023 Fld. 2/1

### CRITERIA FOR YIELDING HIGHWAY SIGN SUPPORTS. FINAL REPORT

by J. P. Cook; A. Bodocsi

Cincinnati Univ.

1970 167p 17refs  
Report no. PB-200 084

Lightweight steel channel supports, used in Ohio for small and medium highway signs, were evaluated by laboratory crash simulator, 40 full-scale crash tests, and computerized analysis. Good correlations were obtained among these methods for deceleration values, and the computer program has sufficient flexibility to be extrapolated to other soil and impact conditions. Results showed that the steel channel post is a yielding sign support. During the test program, no value of deceleration was recorded which exceeded human tolerance levels.

Search terms: Impact tests; Computerized simulation; Breakaway sign supports; Ohio; Laboratory tests; Deceleration; Human deceleration tolerances; Steels

AVAILABILITY: NTIS as PB-200 084

## 2/5 Lighting

HS-011 024 Fld. 2/5

### SUPPLEMENTARY STUDIES IN HIGHWAY ILLUMINATION. FINAL REPORT

by Ned E. Walton; Neilon J. Rowan

Texas A and M Univ. Texas Transp. Inst.

1969 87p 3refs  
Report no. RR-75-13F; Study-2-8-64-75

Prepared in cooperation with the Bureau of Public Roads.

This report summarizes results of five and one-half years of research on highway illumination. Studies were conducted to determine the effects of lighting system geometry on illumination, pavement brightness, and disability veiling brightness produced by various light sources. The cutoff type luminaire was studied and found impractical. The effects of lighting system geometry on roadside sign visibility were studied, and it was found that mounting height has a definite effect on sign visibility and legibility. From studies involving high-mast illumination towers at two interchanges, it was concluded that these are superior to conventional systems. Luminaire supports were studied, and the slip base design proved feasible for a multi-directional breakaway support.

Search terms: Highway lighting; Highway lighting mounting height; Highway lighting standards; Brightness; Pavement reflectivity; Pole impact tests; Impact tolerances; Intersection lighting; Luminaires; Sign visibility; Breakaway light poles; Glare; Sign legibility; High level lighting; Lighting design

## 2/9 Traffic Control

HS-011 025 Fld. 2/9; 4/7

### EMPIRICAL TEST OF A MODEL FOR TRAFFIC ON A TWO-LANE ROAD

by Sven Erlander

Stockholm Univ. (Sweden)

1969 67p 18refs  
Report no. 38

A mathematical model for traffic on a two-lane road is used to derive traffic characteristics such as average speed of vehicles with given desired speed, average number of passings, average flow, and speed distributions from parameters such as density of vehicles in each lane, distribution of desired speeds, maximum speed of oncoming traffic, relative passing distance, minimum sight distance, and average number of jumps of the sight function. Some estimation problems are discussed and the model is applied to empirical data on the same road for two different speed limits and for no speed limit. The model can be used in traffic and safety studies to calculate the effect upon various traffic characteristics of measures such as increased visibility or speed limits.

Search terms: Mathematical analysis; Traffic flow; Traffic distribution models; Headways; Speed studies; Sweden; Traffic characteristics; Mathematical models; Two lane roads; Traffic density; Speed patterns; Sight distances; Oncoming vehicles; Passing; Lane usage; Speed limits; Visibility

## 3/0 HUMAN FACTORS

### 3/4 Driver Behavior

HS-011 026 Fld. 3/4

### THE AUTOMOBILE DRIVER AS A VARIABLE IN AN ENVIRONMENTAL SYSTEM

by Robert D. Campbell; Lawrence E. Schlesinger; A. L. Roark

Smithsonian Institution

1971 22p 16refs  
Contract N00014-67-A-0399-0006  
Report no. AD-722 352

Prepared in cooperation with New Mexico Univ.

Driver behavior is one aspect of a complex technological system called automobile transportation. The automobile transportation system is regarded as a man-environment system which has many characteristics in common with other such systems. Some commonalities are: the system is constantly being evaluated with a view to improving system output by introducing system design changes; the system is sensitively interactive in such a way that changes in one variable are reflected in changes in many other variables; and the variables in the system are subsets of sets which can be used to characterize *any* man-environment system. These traits, applied to the automobile transportation system, make a case for adopting a total systems approach when design changes are recommended for *any* variable. A model which is adaptable to the evaluation-for-design purposes of any man-environment system is suggested.

Search terms: Systems analysis; Variables; Driver behavior; Environmental factors; Man machine systems; Driver modeling; Highway transportation; Mathematical models; Driver vehicle road interfaces; Highway characteristics

AVAILABILITY: NTIS as AD-722 352

HS-011 027 Fld. 3/4

## DRIVING BY THE SEAT OF YOUR PANTS

Anonymous

Published in *Air Force Driver* v3 n6 p10-13 (Nov 1969)

Good seating position affords the comfort and freedom of movement necessary for controlling a car while preventing fatigue. Proper seat adjustment and driving position are illustrated in photographs.

Search terms: Posture; Comfort; Driving; Seat positioning

HS-011 028 Fld. 3/4

## DRIVING WITH THE EXPERTS

by Michael Scarlett

Published in *Autocar* v135 n3937 p10-1 (9 Sep 1971)

Satirical driving interviews reveal two experts' secrets: Sidebourne achieves 55 mph between stoplights by flat-out acceleration and braking, keeps back annoying cross traffic as he swoops confidently into blocked intersections. Twithers, more deliberate, always stops dead on acceleration lanes for a good look around, then holds a safe 47 mph in the passing lane.

Search terms: Satire; Careless driving; Driver behavior; Great Britain; Driver performance

HS-011 029 Fld. 3/4; 2/9

## WARNING LIGHT STUDY. A STUDY OF THE EFFECT ON DRIVER BEHAVIOR OF OPERATING EMERGENCY AMBER LIGHTS

California Hwy. Patrol

1971 200p  
Report no. PB-199 108

Prepared in cooperation with California Division of Highways and Federal Highway Administration.

Amber lights were operated on three types of vehicles; black and white en-

forcement, tow service truck, and maintenance pickup trucks, for three levels of traffic volume. The amber light had little effect on traffic flow during the day. There was some slowing of traffic at night on the two lane, light volume road. The vehicle effect varied; the black and white vehicle had the greatest effect, the pickup the least effect. Experimental design, statistical methodology, and analysis of findings are described in detail.

Search terms: Driver behavior; Warning signals; Night driving; Police vehicles; Traffic flow; Traffic volume; Pickup trucks; Wreckers; Two lane roads; Flashing warning signals; Signal colors; Speed patterns; Statistical analysis; Color coding

AVAILABILITY: NTIS as PB-199 108

HS-011 030 Fld. 3/4; 4/7

## A PREVIEW-PREDICTOR MODEL OF DRIVER BEHAVIOR IN EMERGENCY SITUATIONS. INTERIM TECHNICAL REPORT

by C. V. Kroll; R. D. Roland, Jr.

Cornell Aeronautical Lab., Inc.

1970 105p  
Contract CPR-11-3988  
Report no. CAL-VJ-2251-V-6

A closed-loop nonlinear driver control mathematical model was developed, primarily to enable a better definition of prevailing preimpact conditions for studies aimed at minimizing the incidence and consequences of single vehicle accidents through improvements in roadside design. Combined models of the driver and vehicle permit comparisons of simulated responses with experiments involving maneuvers at or near the upper limits of vehicle and driver control. The mathematical model is described and results of several check-out runs summarized.

**3/4 Driver Behavior (Cont'd.)****HS-011 030 (Cont'd.)**

Search terms: Vehicle control; Road-side hazards; Mathematical models; Computerized simulation; Computer programs; Single vehicle accidents; Driver modeling; Driver emergency responses; Forecasting; Slip; Pre-crash phase; Simulation models; Automobile modeling; Vehicle guidance; Loss of control; Flow charts; Skidding

**3/5 Driver Education****HS-011 031 Fld. 3/5**

**THE MULTIPLE-CAR METHOD.  
EXPLORING ITS USE IN  
DRIVER AND TRAFFIC SAFETY  
EDUCATION**

by Richard W. Bishop; Charles H. Hartman; Francis C. Kenel; Gene MacDowell; Robert O. Nolan; William T. Richards

Automotive Safety Foundation

1967 44p 21refs

The multiple car method of driver instruction uses a special off-street facility under remote direction. Teachers usually communicate with students by radio. Not only is better use made of instructors' time than with an instructor in each car; the method appears to be comparable in learning and in safety. Discussion includes evaluation studies; facility planning; equipment; curricula; and teacher preparation.

Search terms: Multiple car driving instruction; Driver education evaluation; Curricula; Manpower utilization; Automobile driving ranges; High school driving courses; Instructors; Radio communication

**HS-011 032 Fld. 3/5; 3/6**

**YOUTH AND TRAFFIC SAFETY  
EDUCATION. SPECIAL STUDY**

by John H. Reed; Oscar M. Laurel; Francis M. McAdams; Louis M. Thayer; Isabel A. Burgess

National Transp. Safety Board

1971 26p 105 refs  
Report no. NTSB-ST-71-3

The status of knowledge is reviewed and possible reasons for the high death rate of young drivers in the 15-24 age group is discussed; the high involvement of alcohol is shown. The present unknown safety value of current programs of instruction is noted. The need for instruction of youth and adult monitoring of young drivers is discussed. The central role of the driver licensing function is examined as well as the potential role of driver improvement programs. Seven recommendations are directed to NHTSA, focusing on a diagnostic approach to driver preparation, licensing, and improvement programs; efforts in the Alcohol Safety Education Programs; possible approaches to evaluation of driver education programs; extension and improvement of current examination for licensing; integration of efforts of state agencies. Development of highway safety consciousness among young people is also recommended.

Search terms: Adolescent drivers; Driver licensing; Driver education; Driver improvement; Alcohol Safety Action Projects; Alcohol usage deterrents; Age factor in accidents; Young adult drivers; Accident rates; Fatality rates; Problem drivers; Driver education evaluation; Safety education; Drinking drivers; Driver intoxication

AVAILABILITY: NTIS \$3.00

**3/6 Driver Licensing****HS-011 033 Fld. 3/6**

**REDUCTION OF YOUNG  
DRIVER CRASHES IN A  
CONTROLLED PILOT STUDY.  
TWO-YEAR FOLLOW-UP IN ONE  
MICHIGAN HIGH SCHOOL**

by Stanley H. Schuman; Roberta McConochie; Donald C. Pelz

Published in *Journal of the American Medical Association* v218 n2 p233-7 (11 Oct 1971)

11refs

Previous research indicates a high accident rate for young male drivers aged 18 to 20 years. In a pilot study, high-school seniors in a countermeasure program achieved a 50% reduction in their accident rate compared to a control group during a two-year follow-up period. A similar reduction occurred in the accident rate per 100 drivers weighted by severity of crashes among the countermeasure drivers. The results are not statistically significant, but show promise for current trials in large populations. The countermeasure program had two components, small group discussions weekly for seven weeks, and personalized driving letters sent to pilot program seniors at six-month intervals following the discussion workshop.

Search terms: Accident rates; Young adult drivers; High school drivers; Driver improvement; Driver records; Warning letters; Male drivers; Adolescent drivers; Accident severity; Discussion groups; Driver age; Problem drivers; Driver behavior research

**3/8 Environmental Effects****HS-011 034 Fld. 3/8**

**GUIDELINES FOR NOISE  
EXPOSURE CONTROL. INTER-  
SOCIETY COMMITTEE REPORT.**

Anonymous

Published in *Journal of Occupational Medicine* v9 p571-5 (Nov 1967)

17refs

Medical and industrial hygiene specialists developed practical guidelines relating hearing loss to noise exposure, data previously unavailable from any one source. Measurement techniques are suggested, data on impairment incidence by age and exposure given, and methods for estimation of hazard set forth.

Search terms: Noise exposure; Acoustic measurement; Noise tolerances; Hearing; Environmental factors; Deafness; Age factors; Noise control

HS-011 035 Fld. 3/8

# IMPACT OF ENGINEERS AND ENGINEERING ON PEOPLE AND NATURE

by Herbert G. Poertner

1972 6p 2refs  
Report no. SAE-720073

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

In fulfilling their roles in today's sensitive environments, engineers and their works bring about a wide variety of reactions. The resulting consequences on the people who must interact with them, and on nature that must compete with them, are becoming subject to critical social evaluation in the context of awakening concerns for environment, community values, and social consciousness. Engineers and engineering educators should study and measure these impacts, develop an analytical awareness of them, and attempt to develop a methodology for forecasting the impacts of proposed engineering works and products. The planning, designs, and actions of engineers should reflect a philosophy that places the highest of values on the enhancement of the quality of living.

Search terms: Engineers; Engineering; Environmental factors; Forecasting; Environmental planning; Ecology; Technology; Sociological factors

AVAILABILITY: SAE

## 4/0 OTHER SAFETY-RELATED AREAS

### 4/5 Information Technology

HS-011 036 Fld. 4/5

## TOTAL SPECIFICATIONS INFORMATION SYSTEM

by Milton R. Freivogel

General Motors Corp.

1972 11p  
Report no. SAE-720097

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Chevrolet is now using a new procedure for disseminating specification-type information. The new Total Specification Information System (TSIS) is an on-line terminal system featuring immediate response and a common data base. Specifications functions and accomplishments before and with TSIS are described with a history of its development. Functions of a Specifications Dept., procedure before TSIS, history of TSIS, information management system, procedures and concepts of TSIS, educational requirements, statistics, and appraisal of the system are discussed.

Search terms: Information systems; Computerized records management; Specifications

AVAILABILITY: SAE

HS-011 037 Fld. 4/5

## AMERICAN NATIONAL STANDARD VOCABULARY FOR INFORMATION PROCESSING

American National Standards Inst., Inc.

1970 133p refs  
Report no. ANSI-X3.12-1970

This publication provides an alphabetic listing of approximately 1200 entries, each consisting of a term and its definition, for use in information processing activities such as the description, representation, communication, interpretation, and processing of data by human or automatic means. The purpose of this Federal edition is to provide a common reference within government activities.

Search terms: Standards; Glossaries; Data processing; Nomenclature; Information systems; Information retrieval; Dictionaries

AVAILABILITY: Corporate author \$6.00

HS-011 038 Fld. 4/5

## THE ROLE OF INFORMATION PROCESSING SYSTEMS IN ENGINEERING

by Edgar H. Sibley; Hasan Sayani

Michigan Univ.

1972 8p 20refs  
Report no. SAE-720096

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The engineer has been a pioneer in the use of information systems; the referencing of information in handbooks, the communication of information via blueprints, the specification of information for manufacturing, etc. The effect of the computerized information processing system is examined in the light of the

**4/5 Information Technology  
Cont'd.)****HS-011 038 (Cont'd.)**

expanding use of computers in the engineering environment, both technical and managerial. Because these systems are designed for engineers, who will use them for technical problem solving or data management control functions, the engineer must be aware of the characteristics and limitations of these systems. This paper, therefore, deals with the categorization of systems, methods of specification, tools for implementation, and their use. It looks at the historical development of information processing systems, and the factors that drive their implementation; finally, it attempts to postulate the future trends of large-scale systems.

Search terms: Data processing; Engineering; Information systems; Computerized records management

**AVAILABILITY: SAE**

**HS-011 039 Fld. 4/5; 5/4****COMPUTER SIMULATION OF  
AUTOMOTIVE AIR-CONDITION-  
ING CONDENSERS**

by O. Conklu

Ford Motor Co.

1972 11p 6refs

Report no. SAE-720076

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper presents a simulation model to predict the thermal performance of automotive air-conditioning condensers. Operation of the air-conditioning system and the function of the condenser are discussed briefly. Details of the formulation to calculate various performance characteristics are given. Potential applications of the corresponding com-

puter program are described. Comparison of the computer results to test data shows that the model predicts heat rejections within 3-7 and air discharge temperatures within 0.5 F of the laboratory test data.

Search terms: Computerized simulation; Air conditioning; Condensers; Simulation models; Thermal factors; Performance characteristics; Computer programs; Temperature; Laboratory tests; Heat rejection; Equations

**AVAILABILITY: SAE**

**HS-011 040 Fld. 4/5; 5/4****COMPUTER SIMULATION OF  
AUTOMOTIVE AIR CONDITION-  
ING—COMPONENTS, SYSTEM,  
AND VEHICLE**

by Gerald L. Davis; Frank Chianese, Jr.; Timothy C. Scott

Chrysler Corp.

1972 17p 8refs

Report no. SAE-720077

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The basic theory and the techniques upon which the Air Conditioning Analytical Simulation Package (A/CASP) computer program system was developed is outlined. Methods for simulating car air conditioning components, systems, and cool-down performance by computerized mathematical models are presented. Solution techniques for the models of the evaporator, condenser, compressor, and vehicle are outlined. The correlation of test data and analytical predictions is demonstrated.

Search terms: Computer programs; Computerized simulation; Mathematical models; Simulation models; Air conditioning; Evaporators; Condensers; Compressors; Pressure; Flow charts; Thermal factors; Passenger

compartments; Performance characteristics; Temperature

**AVAILABILITY: SAE**

**HS-011 041 Fld. 4/5; 5/20****COMPUTER SPOTS CHARGING  
SYSTEM PROBLEMS**

by Jim May

Arkansas Best Freight System, Inc.

1972 4p

Report no. SAE-720086

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper discusses the use of data processing to pinpoint the causes of component failure and thereby help maintenance supervisors do a more accurate job of determining component durability and cost, and in writing truck/trailer specifications. Results of on-the-spot evaluation of alternator failures on 206 trucks are analyzed. Also listed are several design deficiencies that must be corrected to extend alternator life.

Search terms: Data processing; Truck trailers; Truck specifications; Truck tests; Forecasting; Truck maintenance; Alternators; Electric system failures; Computerized records management; Service life; Durability

**AVAILABILITY: SAE**

**HS-011 042 Fld. 4/5; 5/20****THE COMPUTER AND THE  
CRANKING SYSTEM**

by M. B. Kent; Lloyd Gonyou; Monte R. Blodgett

Saunders Leasing System, Inc.; Shippers' Dispatch; Edgcomb Steel

1972 9p

Report no. SAE-720088

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper gives insight into comments and suggestions gleaned from computerized maintenance reports pertaining to the cranking system. Part I deals with the starting system; what makes it expensive to maintain and what can be done to reduce maintenance costs. Specific suggestions are listed. Inasmuch as 90% of the overall maintenance costs of the cranking system is brought about by faulty batteries, it is important to analyze the nature and extent of battery troubles. This aspect of the cranking system is discussed in Part 2, including tests made of 10 Ryder trucks to delineate problem-causing practices and design deficiencies that contribute to high maintenance costs. Part 3 covers the importance of battery cables and connections. Major items of cranking system expense are compared to show that possible savings can result from improved cables and connections.

Search terms: Truck maintenance; Data processing; Computerized records management; Battery cables; Battery design; Battery life; Starters; Cranking; Truck tests; Maintenance reports; Repair costs

#### AVAILABILITY: SAE

#### 4/7 Mathematical Sciences

HS-011 043 Fld. 4/7; 3/2

**A THREE-DIMENSIONAL MATHEMATICAL MODEL OF AN AUTOMOBILE PASSENGER. EVALUATION OF THE ROADWAY ENVIRONMENT BY DYNAMIC ANALYSIS OF THE INTERACTION BETWEEN THE VEHICLE, PASSENGER, AND ROADWAY**

by Ronald D. Young

Texas A and M Univ, Texas Transp. Inst.,

1970 216p 21refs  
Report no. RR-140-2; Study-2-5-69-140

Sponsored by the Texas Hwy. Dept. in cooperation with the Federal Highway Administration.

The model developed predicts the response of an automobile passenger during vehicle motion of a general nature—a three-dimensional path including simultaneous rotations about the three directions. This model reduces the problem of predicting the accelerations and forces acting on a passenger during a collision or violent maneuver to that of specifying the path of the vehicle as a function of time plus the deformation properties of the vehicle interior. Validation has been achieved for frontal collisions of a dummy on a test cart using no restraint, lap belt, and lap and torso belt. The model provides the highway engineer with biomechanics data on human tolerance limits useful in modifying roadside structures in order to reduce injuries.

Search terms: Deformation; Impact sleds; Roadside hazards; Secondary collisions; Mathematical analysis; Mathematical models; Computerized simulation; Equations of motion; Validation; Driver vehicle road interfaces; Biomechanics; Passenger compartments; Impact forces; Vehicle trajectories; Human body impact tolerances; Occupant modeling; Restraint system usage; Human body simulation; Degrees of freedom; Simulation models

#### 4/8 Transportation Systems

HS-011 044 Fld. 4/8

**SOME THOUGHTS ON FEASIBILITY STUDIES OCCASIONED BY THE APPRAISAL OF ROAD PROJECTS IN THAILAND**

by L. Sychrawa

Published in *Journal of Transport Economics and Policy* v2 n3 p332-348 (Sep 1968)

This article is a discussion of problems experienced by economists and engineers during more than 100 road projects appraisal studies in the Far East in 1966/67. The studies had certain special features, but in general conformed to the pattern of road feasibility studies followed by consultants all over the world. In most countries, 10%-30% of public expenditure is on roads. Road project appraisals therefore represent an important field of application for applied economics. The discussion here is not about the theory of the subject, but about techniques. The central theme is how very difficult it is to handle actual cases in this field to a standard of correctness which is intellectually tolerable.

Search terms: Feasibility studies; Appraisals; Highway planning; Thailand; Financing; Highway costs; Highway usage

## 5/0 VEHICLE SAFETY

### 5/4 Design

HS-011 045 Fld. 5/4

**THE RELATIVE EFFECTIVENESS OF V.I. IMPROVERS ON AN IN-SERVICE VISCOSITY BASIS**

by I. R. H. Crail; P. J. Hattersley

Cooper (Edwin) and Co. Ltd.

1971 12p 13refs  
Report no. SAE-710840

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

It has been shown that the concentration of viscosity index (V.I.) improver polymer required to give a predicted residual viscosity lift in a given base oil, after a shear stability test related to over-tilt-

#### 5/4 Design (Cont'd.)

#### HS-011 045 (Cont'd.)

road performance, is relatively independent of the shear stability index of the polymer over a wide range of shear stability level. Evidence is included which indicates that the high-temperature diesel engine performance of polymethacrylate V.I. improvers is related to the concentration of polymer in the lubricant and independent of the dispersancy capabilities of the polymer. These findings have demonstrated that the use of a predicted in-service viscosity instead of a point-of-sale viscosity as a specification target has a significant effect on the selection of the V.I. improver for use in a lubricant. In particular, it becomes practicable to use more shear stable V.I. improvers than were formerly used.

Search terms: Laboratory tests; Lubricating oil tests; Lubricant additives; Viscosity; Shear stability; Polymers; Polymethacrylates; Diesel engines

AVAILABILITY: SAE

#### HS-011 046 Fld. 5/4

#### RUBBER USE IN 1972 AUTOS

by Ralph F. Wolf

Published in *Rubber Age* v103 n10 p69-76 (Oct 1971)

6refs

Non-tire uses of rubber in cars are increasing. There is hardly any difference in tire usage patterns between 1972 and 1971 models. More elastomers are now used in emission control devices, motor and body mounts, insulation and oil seals, and windshield wiper blades. Changes in fuels and bumpers will cause other changes in elastomer use. Air bags will also use some elastomers.

Search terms: Automobile design; Elastomers; Synthetic rubber; Automobile materials; Rubber; Fuels; Air bag restraint systems; Exhaust emission control devices; Engine mounts; Insulation; Oil seals; Windshield wiper blades; Bumpers

#### HS-011 047 Fld. 5/4

#### PUTTING ELECTRONICS IN CARS OPENS MULTIPLE DESIGN OPTIONS

by William Flanagan

Published in *Automotive Engineering* v79 n12 p15-25 (Dec 1971)

Engineers will have to choose between analog and digital central or dispersed processing, hard wire or multiple information handling when building the computer controlled car. Systems engineering must be done before those decisions can be made. Until then, electronic design will concern sensors and discrete vs. integrated construction. Electronics could raise fuel economy and cut emissions with very lean mixtures.

Search terms: Transducers; Electronic devices in vehicles; Integrated circuits; Fuel economy; Lean fuel mixtures; Air fuel ratio; Time sharing; Driver aid systems; Analog computers; Digital computers; Systems engineering; Automobile design; Sensors; Automatic control; Computerized design; Display systems

#### HS-011 048 Fld. 5/4

#### A COLD LOOK AT LUBRICANTS

by R. R. McCoy; D. S. Taber

Mobil Oil Corp.

1971 13p 13refs  
Report no. SAE-710716

Presented at National Farm, Construction and Industrial Machinery Meeting, Milwaukee, 13-16 Sep 1971.

The increased industrial and commercial activities in the Arctic areas of the world have led to the development of special performance lubricants to meet these requirements. The technical requirements are discussed along with several lubricant approaches. The relative merits of the various types of lubricants including synthesized hydrocarbons are presented together with the different areas of application.

Search terms: Lubricants; Lubricating oils; Viscosity; Cold weather tests; Cold weather starting; Engine speeds; Torque; Engine deposits; Low temperature fluidity; Hydraulic fluids; Performance tests; Physical properties; Canada; Alaska; Engine operating conditions; Diesel engines; Hydrocarbons; Wear tests

AVAILABILITY: SAE

#### HS-011 049 Fld. 5/4

#### THE BASE PITCH CONCEPT OF INVOLUTE GEARS—UNDERSTANDING ITS USEFULNESS AND INTERPRETATION

by C. K. Reece

Deere and Co.  
1971 9p  
Report no. SAE-710633

Presented at a meeting of the SAE Mississippi Valley Section, 29 Apr 1971.

A new concept of gear specification, called the "base pitch concept" is presented. This concept provides an explanation of and aids in understanding the functioning of involute gear teeth in action. It provides the gear designer with a system for interpretation and analysis of the results of information obtained from standard involute profile charts. A

gear drawing specification which eliminates unnecessary information is presented.

Search terms: Gear teeth; Specifications; Pitch; Gears; Mathematical analysis; Errors; Eccentricity; Profile measurement; Engineering drawings

**AVAILABILITY: SAE**

**HS-011 050 Fld. 5/4**

**WHY METALS?**

by Foster C. Bennett

Dow Chemical Co.

1970 8p 15refs  
Report no. SAE-710649

Presented at the Joint Meeting of SAE Mid-Michigan Section and American Chemical Society Midland Section, Midland, 24 Oct 1970.

Thousands of alloy compositions have been investigated for use in automotive and other commercial applications. Zinc, aluminum, and magnesium die casting alloys have similar strength properties. Data are presented on tensile strengths, and thermal and electrical properties. Material cost comparisons are made for an average die casting and an average unfilled molded plastic. Processing and finishing methods for pressure die castings are described.

Search terms: Aluminum alloys; Zinc aluminum alloys; Magnesium; Die castings; Finishes; Thermodynamic properties; Electric properties; Automobile materials; Metal working; Tensile strength; Performance characteristics; Alloys; Plastics; Parts costs; Molding; Manufacturing

**AVAILABILITY: SAE**

**HS-011 051 Fld. 5/4**

**SYSTEM ENGINEERING—A WINDOW SYSTEM**

by Paul Bullock

Chrysler Corp.

1972 8p  
Report no. SAE-720066

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Many of the formal system engineering procedures and techniques developed in the aerospace industry have convenient informal application to the analysis, evaluation, and qualification of new automotive design. This paper describes such "systemization" from a product engineering viewpoint in the development of a hardtop window project. The project is traced through its several design and development stages; and the advantages of the system engineering approach, as well as some of the problems encountered, are explored. The paper concludes with a discussion of additional controls that would have been required to yield the full information recording/retrieval capability demanded for complete system integration on larger projects.

Search terms: Systems analysis; Windows; Window mechanisms; Flow charts

**AVAILABILITY: SAE**

**HS-011 052 Fld. 5/4**

**SOME CONSIDERATIONS RELATIVE TO USE OF SHEET MOLDING COMPOUND FOR AUTOMOTIVE EXTERIOR BODY PANELS**

by William E. Tudor

General Motors Corp.

1972 8p  
Report no. SAE-720061

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Fiberglass-reinforced thermoset materials offer significant advantages to the automotive body design engineer. Parts manufactured from this material possess substantially different properties than zinc or steel parts. These differences must be recognized by the part user so that necessary action may be taken to assure satisfactory part performance.

Search terms: Glass fiber reinforced plastics; Performance characteristics; Automobile materials; Fiberglass; Molding; Body design; Steels; Zinc; Thermosetting resins; Thermal factors; Polyester

**AVAILABILITY: SAE**

**HS-011 053 Fld. 5/4**

**THERMOSETTING PLASTICS FOR AUTOMOTIVE ELECTRICAL INSULATION**

by W. A. Dannels

Hooker Chemical Corp.

1972 8p 4refs  
Report no. SAE-720039

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Thermosetting plastics are the only insulation materials that meet all of the requirements of the high-voltage system—"coil, rotor, and distributor cap." This is due not only to their electrical properties of insulation resistance and arc resistance at elevated temperatures, but also to their dimensional stability, flame, and heat resistance. Increased temperatures under the hood, and more demanding ignition efficiencies to meet the performance and environmental objectives have led to the development of improved thermosetting materials. Performance standards and meaningful

# 5/4 Design (Cont'd.)

## HS-011 053 (Cont'd.)

testing must keep pace with these changes. In the low-voltage system, thermosetting molding compounds are used for applications such as connectors, switch parts, solenoid covers or cases, commutators, and brush holders. For this type of application, although electrical properties are not too demanding, the parts must be structurally sound and dimensionally stable. They have to be produced at a low cost in an automatic system, and hold up under any abuse of assembly or end use. Many recent developments in thermosetting molding equipment and tooling methods have reduced cost and scrap. Some molding operations can be tied in with assembly line procedures. Thermoset materials are being developed to keep up with processing changes. Hopefully, all of this will result in better productivity and improved product reliability.

Search terms: Thermoplastics; Automobile materials; Performance characteristics; Molding; Insulation; Electric systems; Plastics; Electric properties; Ignition systems; Voltage

AVAILABILITY: SAE

## HS-011 054 Fld. 5/4

### PISTON RINGS FOR DIESEL ENGINES—EFFECT OF KEYSTONE ANGLE ON OIL CONSUMPTION

by Bruce Hayes

Dana Corp.

1971 7p 6refs  
Report no. SAE-710815

Presented at the National Combined Fuels and Lubricants, Powerplant and

Truck Meetings, St. Louis, 26-29 Oct 1971.

The effects on oil consumption of keystone piston rings dimensioned for front-edge bearing contact with the piston groove have been compared to the effects of keystone rings dimensioned for back-edge bearing contact with the groove in a statistically designed experiment utilizing a diesel engine at two different power output levels. Blowby was significantly higher with front-edge bearing contact rings than with back-edge bearing contact rings at both power output levels.

Search terms: Oil consumption; Piston rings; Diesel engines; Blowby; Engine operating conditions

AVAILABILITY: SAE

## HS-011 055 Fld. 5/4

### REINFORCED PLASTIC MOLDINGS FOR AUTOMOTIVE APPLICATIONS

by H. J. Sharp

Guest, Keen, and Nettlefolds Ltd. (England)

1972 7p  
Report no. SAE-720064

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper discusses the use of different types of plastics in automotive moldings and relates their importance to vehicle safety. The characteristics of each type are compared and their efficiency and stability as energy-absorbing materials are discussed from the viewpoint of un-reinforced and metal-reinforced structures. Charts are provided to show the extent of plastic use in Europe, the United Kingdom, and North and South America.

Search terms: Plastics; Automobile materials; Molding; Performance

characteristics; Vehicle safety; Energy absorbing materials; Energy absorbing systems; Europe; Great Britain; South America; United States; Canada; Automobile production statistics; Population; Thermoplastics; Glass fiber reinforced plastics; Polyester

AVAILABILITY: SAE

## HS-011 056 Fld. 5/4

### COMPRESSION MOLDING OF GLASS-REINFORCED THERMOPLASTIC LAMINATE IN MECHANICAL STAMPING PRESSES

by John S. Saczawa; James L. Slayton

General Motors Corp.

1972 8p 6refs  
Report no. SAE-720063

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Glass-reinforced thermoplastic laminate materials which are compression molded on mechanical stamping presses have recently been added to the designer's "bag of tricks." Guide Lamp Div., General Motors Corp., has manufactured production lamp housings with this material and process. Chevrolet Motor Div., General Motors Corp., is also manufacturing an emission control part for certain buses. Both Guide Lamp and Chevrolet have prototyped other parts using this concept. A production cycle time reduction over injection molding has been achieved. Presented here is a brief description of the process and a survey of results with these materials and molding techniques. The paper highlights the engineering studies leading to production realities at Chevrolet and Guide Lamp. Design considerations with these materials will also be given.

Search terms: Lamp housings; Mold-

ing; Thermoplastics; Stamping; Laminates; Glass fiber reinforced plastics; Automobile materials; Door design; Battery design

**AVAILABILITY:** SAE

**HS-011 057** Fld. 5/4

### **AUTOMATIC TRANSMISSION FLUID VISCOSITY REQUIREMENTS**

by M. L. Haviland; E. D. Davison

General Motors Res. Labs.

1971 12p 11refs  
Report no. SAE-710838

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

Performance-based test techniques were developed to determine high- and low-temperature automatic transmission fluid viscosity requirements. High-temperature fluid viscosity requirements were determined using engine-transmission-dynamometer tests. Low-temperature fluid viscosity requirements were established with a motor-driven three-speed transmission apparatus. It is concluded that the current used-fluid Dexron viscosity limit of 5.5 cs minimum at 210°F provides a good safety factor for preventing excessive internal leakage at high temperatures. Since some Dexron fluids have -40°F viscosities approaching the 55,000 cp specification limit, lowering it will be considered in future specifications.

Search terms: Transmission fluids; Automatic transmissions; Low temperature fluidity; High temperature; Viscosity; Transmission tests; Mathematical models; Torque; Pressure time histories; Performance tests; Clutches; Engine speeds; Cavitation; Temperature endurance tests

**AVAILABILITY:** SAE

**HS-011 058** Fld. 5/4; 4/5

### **DATA ACQUISITION AND TESTING STUDY**

by K. L. Walker; E. A. Warman

Perkins Engines Ltd. (England)

1971 12p 3refs  
Report no. SAE-710818

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

Initial stages are described of the use of automatic controls in the development testing of diesel engines. In the possible levels of automation, the full range involved runs from something below the present level to a full computerized system operating engines through all the required test programs, and producing documented reports on the results as output. The optimum level of automation with regard to technical and operational requirements is analyzed, and the preliminary results from a pilot computer-controlled test-bed are presented. Full computer control of engine testing seems to be technically feasible.

Search terms: Automatic control; Diesel engines; Automation; Computerized test methods; Thermodynamics; Engine tests; Durability tests; Data processing; Data acquisition; Engine operating conditions; Thermal factors; Engine speeds

**AVAILABILITY:** SAE

**HS-011 059** Fld. 5/4; 4/7

### **ROVACS: A NEW ROTARY-VANE AIR-CYCLE AIR-CONDITIONING AND REFRIGERATION SYSTEM**

by Thomas C. Edwards; Alan T. McDonald

Florida Technological Univ.; Purdue Univ.

1972 10p 4refs  
Report no. SAE-720079

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The ROVAC unit is a rotary vane combination compressor-expander-circulator, which is the key element in a new air-cycle refrigeration system. Results of an analytical and experimental feasibility study of the system are reported here. The objective of the study was to develop and verify a mathematical model of the system, including heat-exchanger pressure loss and mechanical friction. A parametric study was made to determine the geometry for a unit capable of cooling a passenger car, and a conservatively designed prototype was built and tested. The prototype system produced a cooling capacity of 5400 Btu/h and generally verified the accuracy of the mathematical model. The coefficient of performance of the prototype system may be somewhat lower than that of a typical vapor-cycle system. However, the ROVAC system is much simpler and will most likely be cheaper to build. The system response time is very short (approximately 10 s), so immediate passenger comfort could be provided in an automotive application. Although a passenger car application is used as an example in the paper, the mathematical model could be used for computer-aided design of any ROVAC system.

Search terms: Air conditioning; Compressors; Cooling systems; Performance characteristics; Mathematical models; Computerized design; Pressure; Heat exchangers; Friction; Parameters

**AVAILABILITY:** SAE

5/6 Fuel Systems

HS-011 060 Fld. 5/6

**EXHAUST EMISSION CONTROL  
BY THE FORD PROGRAMMED  
COMBUSTION PROCESS-PROCO**

by A. Simko; M. A. Choma; L. L. Repko

Ford Motor Co.

1972 25p 4refs  
Report no. SAE-720052

Presented at Automotive Engineering  
Congress, Detroit, 10-14 Jan 1972.

The Ford Stratified Charge Combustion Process (FCP) which utilizes direct fuel injection has been further developed for reduced exhaust emissions. With air throttling, exhaust gas recirculation, low thermal inertia exhaust manifold, and a noble metal catalyst, low gaseous emissions have been achieved at low mileage on a 1/4 ton military utility truck with acceptable fuel economy and driveability. Dynamometer and vehicle emission data and details of the fuel injection and air-fuel ratio control system are described. The PROCO (Programmed Combustion) concept is described and tests with an experimental engine are discussed.

Search terms: Exhaust emission control; Exhaust emission control devices; Fuel injection; Throttling; Exhaust gas recirculation; Exhaust manifolds; Catalysts; Fuel economy; Driveability; Thermal factors; Military vehicles; Dynamometers; Power output; Truck tests; Vehicle mileage; Hot-starts; Coldstarts; Experimental engines; Air fuel ratio; Stratified charge engines; Controlled combustion systems; Combustion; Nitric oxide; Hydrocarbons; Carbon monoxide; Engine operating conditions; Ignition timing; Smoke; Exhaust emission tests

**AVAILABILITY: SAE**

HS-011 061 Fld. 5/6

**TIME-TEMPERATURE HISTORIES OF SPECIFIED FUEL SYSTEMS. VOL. 1. FINAL REPORT**

Scott Res. Labs., Inc.

1969 290p  
Report no. PB-200 252

Measurements were made on 80 vehicles during the summer of 1968 in Los Angeles County. A fuel system configuration survey was made and the test vehicles were selected to represent the maximum number of different fuel system configurations possible. The vehicles were instrumented to measure 16 fuel system temperatures and pressures. Several short trips during the day cause higher fuel tank and carburetor maximum temperatures, as do commuting trips on freeways. Ambient temperature can explain up to 80% of variance in fuel tank liquid and vapor temperature maxima, but only 10-35% of variance observed for carburetor fuel bowl temperature.

Search terms: Statistical analysis; Operating temperature; Engine operating conditions; Fuel systems; Travel patterns; Carburetors; Los Angeles County; Commuting patterns; Freeway driving; Fuel tanks; Instrumented vehicles; Regression analysis; Driving conditions; Ambient temperatures; Pressure time histories; Operating pressure; Fuel systems

**AVAILABILITY: NTIS as PB-200 252**

HS-011 062 Fld. 5/6

**MEASURING THE EFFECT OF SPARK PLUG AND IGNITION SYSTEM DESIGN ON ENGINE PERFORMANCE**

by Richard R. Burgett; Joseph M. Leptich; Karma V. S. Sangwan

General Motors Corp.

1972 15p 6refs  
Report no. SAE-720007

Presented at Automotive Engineering  
Congress, Detroit, 10-14 Jan 1972.

Cycle-to-cycle combustion variation and engine emission levels are now recognized as effective indicators of engine performance. A system was devised that directly indicates combustion variation by measuring the work produced in a combustion chamber for every power stroke; it also continuously monitors engine emission level. Using this system, then, the effects of spark plug and ignition system variables on engine performance were examined. These criteria were employed in investigating the effects of spark plug gap size, gap location, electrode size and gap geometry, and the effects of spark timing, spark duration, and spark energy at various engine air-fuel ratios. In addition to studying each variable independently, statistically designed experiments to investigate the interactions between the variables were conducted. Although all the variables had measurable effects on engine performance, the most significant were spark plug gap size, gap location, spark timing, and spark duration.

Search terms: Spark plugs; Engine tests; Engine performance; Engine operating conditions; Air fuel ratio; Ignition timing; Ignition systems; Combustion rate; Combustion chambers; Exhaust emission tests; Test equipment; Computerized test methods; Electrodes; Hydrocarbons; Unburned fuels; Fuel injection; Variables; Statistical analysis

**AVAILABILITY: SAE**

**HS-011 063 Fld. 5/6**

**COOPERATIVE EVALUATION OF TECHNIQUES FOR MEASURING NITRIC OXIDE AND CARBON MONOXIDE. A REPORT OF THE PROGRAM GROUP ON DIESEL EXHAUST COMPOSITION OF THE AIR POLLUTION ADVISORY COMMITTEE OF THE COORDINATING RESEARCH COUNCIL, INC.**

by J. M. Perez; L. C. Broering; J. H. Johnson

Caterpillar Tractor Co.; Cummins Engine Co., Inc.; Michigan Technological Univ.

1972 10p 7refs  
Report no. SAE-720104

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A Coordinating Research Council cooperative program was conducted to evaluate the measurement methods used to analyze nitric oxide and carbon monoxide in diesel exhaust. Initially, a single-cylinder test engine was circulated among participants with poor results. Tests were then conducted at one site using a multicylinder diesel engine. Six organizations participated in the program. Exhaust analyses were conducted at steady-state engine conditions and on a 3 min cycle test. Span gases of unknown concentration were also analyzed. The participants' results varied but averaged less than  $\pm 5\%$  standard deviation both within (repeatability) and among (reproducibility) the instruments. The short cycle test was in good agreement with the steady-state measurements. No significant difference in the use of Drierite, nonindicating Drierite, or Aquasorb desiccants was evident in sampling system tests. The instrumentation and methods used in this study were satisfactory for conducting emission measurements of diesel exhaust.

Search terms: Carbon monoxide; Nitric oxide; Diesel engine exhaust emissions; Exhaust emission tests;

Exhaust gases; Measuring instruments; Test equipment; Engine operating conditions; Steady state; Gas sampling; Engine speeds

**AVAILABILITY: SAE**

**HS-011 064 Fld. 5/6**

**AN ENGINE'S DEFINITION OF UNLEADED GASOLINE**

by Ralph P. Doelling

Cities Service Oil Co.

1971 8p 14refs  
Report no. SAE-710841

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

A laboratory engine test program designed to investigate the effect of varying gasoline lead levels upon changes in hydrocarbon exhaust emissions levels resulting from combustion chamber deposits and valve recession was extended to very low lead levels. The results of this program define the amount of lead a fuel may contain before lead deposit effects on emissions are observed and valve recession problems are eliminated as falling between 0.04-0.07 gm/gal. The usefulness of these parameters to define unleaded gasoline is discussed, together with other parameters that must also be investigated before a complete definition of unleaded gasoline can be established.

Search terms: Laboratory tests; Engine performance; Lead free gasoline; Exhaust emission tests; Exhaust valve wear; Hydrocarbons; Combustion chamber deposits; Knock; Low lead gasoline; Scavenging

**AVAILABILITY: SAE**

**HS-011 065 Fld. 5/6**

**VEHICLE EMISSIONS—HOW WE ARE WINNING THE WAR ON AIR POLLUTION**

by G. A. Lacy

Chrysler Corp.

1970 8p  
Report no. SAE-710365

Presented at the SAE Indianapolis Section meeting, Indianapolis, 15 Oct 1970.

The efforts of the automobile industry to reduce exhaust emissions have resulted in many improvements and reductions of exhaust pollutants in the past ten years. The facts presented in this paper tend to refute the necessity for stricter legal restrictions on antipollution components in cars, and it is suggested that the additional costs that buyers will assume could well be directed elsewhere to better advantage in controlling atmospheric pollution. The emission and evaporative control systems and the electric, steam, and gas turbine engines are discussed.

Search terms: Exhaust emission control devices; Air pollution control; Evaporative emission control devices; Crankcase emission control; Nitrogen oxides; Carbon monoxide; Particulate air pollutants; Lead free gasoline; Steam engines; Gas turbine engines; Electric motors; Quenching distance

**AVAILABILITY: SAE**

**HS-011 066 Fld. 5/6**

**A NEW DEUTZ MULTIFUEL SYSTEM**

by Gerhard Finsterwalder

Klockner-Humboldt-Deutz A.G. (West Germany)

## 5/6 Fuel Systems (Cont'd.)

### HS-011 066 (Cont'd.)

1972 18p 9refs  
Report no. SAE-720103

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

As manufacturers of air-cooled diesel engines, the company of Klockner-Humboldt-Deutz (KHD) undertook the rather rapid development of a multifuel engine on the basis of a proved mass-produced, air-cooled unit. Being equal in output, this new engine had to run on all fuels and fuel mixtures obtainable at gasoline stations without any modifications being necessary. Preferably, it had to be produced by means of the same manufacturing facilities as the series engine and features a maximum number of identical parts. The solution to the problem involves supplementing the series engine with a high-tension ignition system employing a special spark plug in the direct vicinity of the injection nozzle. This spark plug can be subsequently installed following the rework of standard parts. By using the same basic setting of injection and ignition for all fuels, it is possible to attain absolutely knock-free combustion, with a gentle compression curve and a minimum of cyclic pressure variations.

Search terms: Diesel engines; Engine design; Engine operating conditions; Dual fuel vehicles; Ignition systems; Spark plugs; Fuel mixtures; Engine modification; Fuel systems; Combustion chamber design; Fuel injection; Cylinder heads; Ignition timing; Engine tests; Fuel consumption; Cold-starts; Pressure; Turbocharging

AVAILABILITY: SAE

## HS-011 067 Fld. 5/6

### FUEL SYSTEM TIME-TEMPERATURE HISTORIES DURING SPECIFIED CAR USE PATTERNS (A CRC-APRAC PROJECT REPORT)

by H. I. Wilson

Texaco, Inc.

1972 10p 16refs  
Report no. SAE-720080

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Time-temperature histories of fuel system components were measured on 80 passenger cars in the summer of 1968 in Los Angeles for several 24 h use patterns simulating normal vehicle operation. These included both driving segments on several types of highways and engine-off soak periods. Ambient temperature, type of driving, and vehicle design features have the greatest influences on fuel system temperatures. These time-temperature histories are of interest for fuel system evaporative emissions study. Two applications of these data have been reported.

Search terms: Driving conditions; Engine operating conditions; Automobile design; Ambient temperatures; Fuel systems; Los Angeles; Automobile urban usage; Evaporative emissions; Temperature; Time factors; Regression analysis; Mathematical models; Operating temperature

AVAILABILITY: SAE

## HS-011 068 Fld. 5/6

### EFFECT OF AIR SWIRL ON SMOKE AND GASEOUS EMISSIONS FROM DIRECT-INJECTION DIESEL ENGINES

by I. M. Kahn; C. H. T. Wang; B. E. Langridge

C. A. V. Ltd. (England)

1972 10p 15refs  
Report no. SAE-720102

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper describes and discusses the results obtained from tests of the effect of air swirl variations on smoke and gaseous emissions from direct-injection-type diesel engines. Within the limits of the swirl variations used, an increase in swirl reduced emissions of smoke and carbon monoxide but increased nitric oxide emissions. An increase in swirl also makes it possible to retard appreciably the injection timing for optimum engine efficiency, and this more than compensates for the increase in nitric oxide emission due to the increase in swirl. It is also shown that the air swirl intervenes in the processes of smoke and gaseous pollutant formation by affecting the details of the fuel-air mixing processes.

Search terms: Diesel engine exhaust emissions; Carbon monoxide; Nitric oxide; Engine operating conditions; Smoke; Air fuel ratio; Fuel injection; Air flow rates; Engine performance; Combustion chamber swirl; Mathematical models; Engine speeds; Exhaust emission tests; Exhaust gases; Fuel mixtures; Combustion rate

AVAILABILITY: SAE

## HS-011 069 Fld. 5/6

### AUTOMOTIVE PARTICULATE EMISSIONS AND THEIR CONTROL

by K. Habibi

Du Pont de Nemours (E. I.) and Co.

1970 8p  
Report no. SAE-710638

Presented at a joint meeting of SAE Mid-Michigan Section and American

Chemical Society Midland Section,  
Midland, 24 Oct 1970.

Over the past 15 years, a large amount of effort has been devoted to the development of sampling and analytical techniques to measure the gaseous components of vehicle exhaust. In contrast, the amount of activity spent in developing methods for determining the quantity and composition of particulate matter in vehicle exhaust has been quite small. Further, there is no procedure for determining the total particulate emission rate from cars, or a defined test cycle for rating of cars. However, particulate emission control standards are being considered for 1975. Sampling and measurement of exhaust particulate matter is a very complex problem, and systems to do this have only recently been developed. Two basic sampling systems are described briefly.

Search terms: Particulate air pollutants; Lead; Exhaust emission control device tests; Exhaust emission standards; Exhaust emission tests; Exhaust emission sampling; Exhaust composition; Lead free gasoline; Leaded gasoline; Test equipment; Particle size analysis; Exhaust tars

**AVAILABILITY:** SAE

**HS-011 070** Fld. 5/6

### CALIFORNIA GETS THE AIR (AND EGR)

Anonymous

Published in *SAE Journal of Automotive Engineering* v79 n10 p18-21 (Oct 1971)

Tighter nitrogen oxides emission limits are forcing manufacturers to use air injection and exhaust gas recirculation (EGR) on some 1972 models. California standards are three grams per mile  $\text{NO}_x$  in 1972, two grams in 1974. The federal standard of three grams per mile in 1973 is about 40% less than California's because of differing measurement tech-

niques. Approaches currently being explored to reduce emissions include: variable and fixed EGR systems; air injection reactors; new choke controls; increased air/fuel ratio with inlet air temperature control; mechanical speed controlled spark; and various devices to reduce evaporative emissions. Major car manufacturers' 1972 innovations for emission control are compared.

Search terms: Exhaust emission control devices; Exhaust emission standards; Exhaust gas recirculation; Air injection reactor systems; Automobile models; Nitrogen oxides; Air fuel ratio; California; Evaporative emission control devices; Chokes; Spark timing

**HS-011 071** Fld. 5/6; 5/4

### DIESEL EMISSIONS AS RELATED TO ENGINE VARIABLES AND FUEL CHARACTERISTICS

by W. F. Marshall; R. D. Fleming

Bureau of Mines

1971 8p 5refs  
Report no. SAE-710836

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

The influences of fuel characteristics and engine parameters on exhaust emissions were studied experimentally using four diesel engines. Test engines were direct injection: two-cycle, four-cycle, and turbo-charged four-cycle, using seven fuels to cover the range of fuels available nationwide. Engine variables included fuel injection, intake air temperature and density, exhaust recirculation, and water injection. Recirculation and water injection were effective in limiting  $\text{NO}_x$  emissions with little effect on performance or other emissions. No fuel property except for density influence on CO emission showed consistent effect.

Search terms: Diesel engine exhaust emissions; Engine operating conditions; Engine tests; Diesel fuels; Exhaust emission control; Nitrogen oxides; Fuel injection; Exhaust gas recirculation; Water injection; Fuel properties; Carbon monoxide; Air fuel ratio; Exhaust odors; Ambient temperature; Engine performance

**AVAILABILITY:** SAE

**HS-011 072** Fld. 5/6; 5/15

### THE AUTOMOTIVE ENGINE— TODAY AND TOMORROW. HORNING MEMORIAL LECTURE

by Max M. Roensch

1971 18p 26refs  
Report no. SAE-710845

Presented at the National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, 26-29 Oct 1971.

Automotive engine output and efficiency have greatly improved over the years, due to the combined efforts of the automotive and petroleum industries. Octane requirements of the 1971 models have been generally reduced to meet the stringent exhaust emission standards. The economic impact of the change from the 94 and 100 octane number fuels to a 91 octane lead-free gasoline are presented. The future of the piston engine, as well as possible substitutes, is discussed, in view of the stringent emission controls proposed for 1975 and 1976. A critical review of both the ambient air quality and emission standards indicates the need for revisions and a careful examination of the cost-benefit ratio, so that the passenger car buyer will not be needlessly penalized with both high initial costs and high operating costs.

## 5/6 Fuel Systems (Cont'd.)

### HS-011 072 (Cont'd.)

Search terms: Exhaust emission control devices; Electric vehicles; Steam engines; Exhaust emission standards; Octane requirements; Lead free gasoline; Wankel engines; Exhaust gas recirculation; Nitrogen oxides; Carbon monoxide; Exhaust emission tests; Compression ratio; Leaded gasoline; Fuel economy; Air pollution emission factors; Vehicle air pollution; Propulsion systems; Hydrocarbons; Gas turbine engines

AVAILABILITY: SAE

## 5/9 Inspection

### HS-011 073 Fld. 5/9

#### PERIODIC MOTOR VEHICLE INSPECTION. A COMPARATIVE DATA ANALYSIS

American Assoc. of Motor Vehicle Administrators

1971 102p

This study is a national survey of management procedures and costs of operation in the 32 states which have periodic motor vehicle inspection. Each program is compared with the highway safety program standard on inspection. The study will provide state administrators of inspection programs with an overview. The absence of valid data on inspection effectiveness has been a handicap in the development of inspection programs.

Search terms: Vehicle inspection; Inspection costs; Inspection procedures; Financing; Safety standards compliance; Inspection effectiveness; Inspection records; Inspection stations; Inspection standards; Defect

correction; Defective vehicles; Inspector training; Statistical analysis; Questionnaires; Data acquisition

## 5/10 Lighting Systems

### HS-011 074 Fld. 5/10

#### SOLID STATE LAMPS FOR TRANSPORTATION VEHICLES

by J. W. Hall, 2nd.

Published in *Automotive Engineering* v79 n11 p32-7 (Nov 1971)

Solid state lamps provide reliability and compatibility with integrated and hybrid electronic circuits now finding automotive applications. They can be used as indicator lamps for safety and operational status displays or for low-level illumination. Construction, operation, and applications in lamp-detector combinations are described.

Search terms: Indicator lights; Instrument panel lighting; Solid state devices; Vehicle lighting; Performance characteristics; Display systems; Semiconductors; Warning systems; Detectors

### HS-011 075 Fld. 5/10; 4/5; 5/11

#### LIGHTING SYSTEM PERFORMANCE AND THE COMPUTER AS A MAINTENANCE TOOL

by Charles J. Owen; Wesley S. Trindal; Luther E. Smith

Whitaker Cable Corp.; Army Mobility Equipment Res. and Devel. Center; Burlington Industries

1972 16p  
Report no. SAE-720087

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

This paper consists of three parts. The first part discusses good and bad electrical wiring, its causes and effects, and the ways in which specific hindrances to good performance can be minimized or eliminated. Several examples are cited to pinpoint practices that create problems in the wiring system and to show how such problems can be avoided. The second part covers vehicular lighting systems: malfunction and causes of failure, and ways of protecting the lighting system. Also discussed are the efforts of the industry associations to provide quality and standardization. The final section tabulates the results of data which have been entered into a computer memory bank in regard to the cost of maintenance on the lighting system.

Search terms: Electric systems; Vehicle lighting; Computerized records management; Maintenance reports; Defective wiring; Wiring; Lamp failures; Lighting design; Truck design; Standardization; Truck maintenance; Performance characteristics; Quality control

AVAILABILITY: SAE

## 5/15 Propulsion Systems

### HS-011 076 Fld. 5/15

#### TECHNOLOGICAL TRENDS IN POWER SEMICONDUCTORS SIGNIFICANT FOR ELECTRIC VEHICLE CONTROLS

by John C. Hey

General Electric Co.

1972 9p 4ref  
Report no. SAE-720108

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Over the past decade, significant areas of power semiconductor development have been: increased electrical performance characteristics and optimization of the

mix of same to meet specific application requirements; improved packaging for better heat management and lower system cost; thoughtful rating and characterization of devices specifically tailored to the needs of the control equipment designer. These developments, as would be expected, have precipitated the wide acceptance and usage of power semiconductors in diverse areas of power control. The resultant benefit has been an ever improving system performance at a decreasing system cost.

Search terms: Semiconductors; Control equipment; Electric vehicles; Performance characteristics; Electric system design; Power loss; Cooling systems

AVAILABILITY: SAE

#### 5/18 Steering Control System

HS-011 077 Fld. 5/18; 3/4

#### LEARN TO SKID AND YOU'LL DRIVE MORE SAFELY ON ICE

by Jan P. Norbye

Published in *Popular Science* v199 n5 p65-7 (Nov 1971)

A champion rally driver shows control techniques on a frozen lake. Skids can be controlled or started deliberately to improve your control of an emergency situation. Induced by braking, turning, or wheelspin (too much power), skids must be controlled differently in front drive or rear drive cars. But ice just below freezing is so slippery even chains require over three times the stopping distance of dry pavement.

Search terms: Driver emergency responses; Driver skills; Skid control; Icy road conditions; Skid pans; Vehicle control; Sideslip; Loss of control

#### 5/20 Trucks and Trailers

HS-011 078 Fld. 5/20; 4/7

#### HIGHWAY VEHICLE IMPACT STUDIES: TESTS AND MATHEMATICAL ANALYSES OF VEHICLE, PACKAGE, AND TIE-DOWN SYSTEMS CAPABLE OF CARRYING RADIOACTIVE MATERIAL

by O. A. Kelly; W. C. Stoddart

Oak Ridge National Lab.

1970 152p  
Contract W-7405-eng-26  
Report no. ORNL-NSIC-61

Four vehicle impact tests were performed with three different combinations of truck tractors and semitrailers and two types of cargo. The remotely operated test vehicles were impacted against a 350-ton barrier at various velocities. The instruments on the tractors were damaged during impact. Photographic measurements provided the most meaningful description of the dynamic impact behavior. The mathematical model developed in conjunction with these tests did not accurately describe the actual vehicle impact behavior. While all the desired quantitative data were not obtained, sufficient structural and transportability data were gained to assure a positive approach for evaluating the dynamics involved in future impact tests. The purpose of the tests was the development of test and instrumentation techniques and the acquisition of data on nuclear material transport for accident studies.

Search terms: Low speed impact tests; Impact tests; Instrumented vehicles; Mathematical models; High speed photography; Simulation models; Radioactive materials; Transportation of radioactive materials; Truck tractors; Truck trailers; Semitrailers; Measuring instruments; Test equipment; Barrier collision tests; Impact forces; Vehicle dynamics; Remote control

AVAILABILITY: NTIS \$3.00

HS-011 079 Fld. 5/20; 5/18

#### GMC ASTRO AIRE REAR SUSPENSION

by Robert F. Schmidt

General Motors Corp.

1972 7p  
Report no. SAE-720106

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

The purpose of this paper is to describe the recent development by GMC of an over-the-highway 34,000# tandem rear axle air suspension system for heavy duty truck/tractor applications. Various design approaches for truck air suspensions during the past two decades are touched upon to trace the evolution process leading to the present design philosophy which provides roll resistance comparable to steel leaf spring suspension systems.

Search terms: Air suspension systems; Truck stability; Vehicle weight; Roll; Truck tractors; Articulated vehicles; Heavy duty vehicles; Control arms; Springs; Performance characteristics

AVAILABILITY: SAE

HS-011 080 Fld. 5/20; 5/18

#### EVOLUTION OF AN AIR SUSPENSION SYSTEM FOR TRUCKS

by W. S. Locke

International Harvester Co.

1972 17p  
Report no. SAE-720105

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

A new truck air suspension system has been developed which provides excellent

5/6 Fuel Systems (Cont'd.)

HS-011 080 (Cont'd.)

roll stability and articulation capability without compromising the exceptionally soft ride characteristics of air suspension. The concurrent realization of roll stability and articulation capability for tandem driving axles has been achieved by designing a semirigid, roll-resisting, rear rear axle, to be used in conjunction with a freely articulating, forward rear axle. This principle applies equally well for single driving axle vehicles, where the rigid axle provides the same roll stability and articulation, not really a problem on single axle vehicles, is provided by frame and front axle suspension flexibility. The new suspension was designed to fit vehicle models ranging 23,000-54,000 lb gvw, and a saddle arrangement was developed to attach the rear axle housing to the trailing arm. Aluminum forgings were used in an effort to achieve minimum weight in every suspension part and all chassis components.

Search terms: Air suspension systems; Truck stability; Front axles; Rear axles; Vehicle weight; Roll; Vehicle riding qualities; Articulated vehicles; Aluminum; Chassis design; Durability tests; Performance tests

AVAILABILITY: SAE

HS-011 081 Fld. 5/20; 5/18

DEVELOPMENT OF DRIVE AXLE AIR SUSPENSION FOR HIGHWAY TRACTORS

by O. Lee Henry

Lear Siegler, Inc.

1972 8p

Report no. SAE-720107

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Trailer air suspensions have been commonly applied to heavy-duty over-the-highway trailers. Recently, several concepts of drive axle air suspensions have been developed within the industry to various stages. This paper presents concept parameters, product development, and suspension development of the Newway Drive Axle Air Suspension (ARD). Performance ride and handling factors, compatibility, and structural integrity were the established guidelines.

Search terms: Air suspension systems; Heavy duty vehicles; Vehicle riding qualities; Vehicle handling; Performance characteristics; Truck stability; Cornering; Roll; Performance tests; Stress analysis; Fatigue life; Drive axles; Truck tractors

AVAILABILITY: SAE

5/22 Wheel Systems

HS-011 082 Fld. 5/22

NBS RECOMMENDATIONS FOR WET TRACTION STANDARDS FOR PASSENGER CAR TIRES

by F. Cecil Brenner; Akira Kondo

National Bureau of Standards

1970 10p

Contract FH-11-6090

Report no. NBS-10 282

Traction tests on wet surfaces included: vehicle stopping distance tests at three speeds; vehicle spinout speed tests; locked wheel trailer tests; and toe-in trailer tests. It is concluded that tires should not be quality graded for wet traction, but a minimum standard for traction should be imposed since tread wear will be rated in the quality grading system. The recommendation for stopping distance is that at 50 mph with four locked wheels, the stopping distance shall be no more than 220 feet on each of the three wet pavement surface types tested. The recommendation for spinout

is that on a 20 degree curve, no tire shall spin out at speeds below 27 mph on each of three wet pavement surface types.

Search terms: Tire test equipment; Tire skid resistance; Tire grading; Tire standards; Tire traction; Wet road conditions; Tire tests; Spin control; Pavement skidding characteristics; Stopping distance; Tire pavement interface; Wheel locking friction; Tire treads; Tire quality; Tire performance

HS-011 083 Fld. 5/22; 2/6; 2/4; 2/7

STUDIES OF STUDDERED-TIRE DAMAGE AND PERFORMANCE IN ONTARIO DURING THE WINTER OF 1969-70

by P. Smith; R. Schonfeld

Published in *Highway Research Record* n352 p1-15 (1971)

14refs

Presented at the 50th annual meeting of the Highway Research Board and sponsored by the Task Force on Effect of Studded Tires.

Measurements and observations during the winter of 1969-70 show that, with 32% of passenger vehicles in Ontario equipped with studded tires, substantial pavement wear and widespread loss of traffic markings continue. The performance to date of experimental wear-resistant concrete and bituminous pavements and of traffic markings indicates that although improvements are possible no lasting solution has yet been found. Studded-tires performance tests are reviewed and data are presented on the occurrence of various road conditions in winter and the analysis of accidents. Little benefit is established from the use of studded tires except in icy conditions that occur relatively infrequently in Ontario.

Search terms: Pavement wear; Pavement skid resistance; Studded tires; Tire skid resistance; Highway maintenance; Bituminous concrete pavements; Tire performance; Public opinion; Ontario; Pavement markings; Concrete pavements; Winter driving; Road conditions; Winter accidents; Damage costs

## NHTSA DOCUMENTS

### NHTSA Contractors Reports

HS-800 504 Fld. 1/1

#### PATIENT HANDLING MANUAL FOR EMERGENCY MEDICAL TECHNICIANS—AMBULANCE

by Karen Bratsenis; Ariene Cleven; Richard Warner

Dunlap and Associates, Inc.

1972 134p  
Contract FH-11-7475

Aspects of patient handling discussed are: patient handling equipment, including equipment for carrying patients, ambulance design, and ambulance stretcher supplies; equipment selection and preparation; transferring of patients to stretchers; moving stretcher patients; loading and unloading ambulance; special problems in patient handling, such as spinal injuries, unconsciousness, resuscitation, extremity injuries, infants, hard to control patients, and handling in confined areas.

Search terms: Ambulance design; Ambulance personnel training; First aid; Emergency medical services; Transportation of injured; Ambulances; Medical treatment; Stretchers; Emergency equipment; First aid equipment; Resuscitation; Instruction manuals; Spinal injuries; Arm injuries; Leg injuries; Injury severity; Airway maintenance; Infants

AVAILABILITY: GPO \$0.60

HS-800 561 Fld. 5/9

#### VEHICLE-IN-USE SAFETY STANDARDS STUDY. CALIFORNIA. FINAL REPORT

by Fisher; Eidemiller; Biche

Ultrasystems, Inc.

1971 474p  
Contract FH-11-7525  
Report no. US-81802-2

Report for Jun 1970-Aug 1971.

This study was conducted to determine the in-use condition of automobiles in states with periodic motor vehicle inspection as compared with those in states with random motor vehicle inspection. Pennsylvania, New Jersey, and Washington, D. C. were used as the PMVI areas with California as the random inspection area. Data were collected from diagnostic centers. Criteria for selection of the centers were developed. Also, standard component test criteria were developed for evaluating tested components as being in a "pass" or "defective" condition. It was concluded that the three areas studied which had periodic motor vehicle inspection showed vehicles in significantly better condition than the vehicles in the random inspection state. Data processing for each file group considered three variables: vehicle age, vehicle mileage, and vehicle model year. The California statistics are given.

Search terms: Used automobiles; Vehicle inspection; Pennsylvania; New Jersey; District of Columbia; California; Data acquisition; Defective vehicles; Automobile defects; Diagnostic centers; Vehicle mileage; Vehicle age; Date of manufacture; Variables; Histograms; Statistical analysis; Computer programs; Vehicle safety standards

AVAILABILITY: NTIS

HS-800 563 Fld. 5/9

#### VEHICLE-IN-USE SAFETY STANDARDS STUDY. NEW JERSEY. FINAL REPORT

by Fisher; Eidemiller; Biche

Ultrasystems, Inc.

1971 318p  
Contract FH-11-7525  
Report no. US-81202-2

Report for Jun 1970-Aug 1971.

This study was conducted to determine the in-use condition of automobiles in states with periodic motor vehicle inspection as compared with those in states with random motor vehicle inspection. Pennsylvania, New Jersey, and Washington, D.C. were used as the PMVI areas with California as the random inspection area. Data were collected from diagnostic centers. Criteria for selection of the centers were developed. Also, standard component test criteria were developed for evaluating tested components as being in a "pass" or "defective" condition. It was concluded that the three areas studied which had periodic motor vehicle inspection showed vehicles in significantly better condition than the vehicles in the random inspection state. Data processing for each file group considered three variables: vehicle age, vehicle mileage, and vehicle model year. The New Jersey statistics are given.

Search terms: Used automobiles; Vehicle inspection; Pennsylvania; New Jersey; District of Columbia; California; Data acquisition; Defective vehicles; Automobile defects; Diagnostic centers; Vehicle mileage; Vehicle age; Date of manufacture; Variables; Histograms; Statistical analysis; Computer programs; Vehicle safety standards

AVAILABILITY: NTIS

HTSA Contractors Reports  
Cont'd.)

HS-800 564 Fld. 5/9

VEHICLE-IN-USE SAFETY  
STANDARDS STUDY. PENN-  
SYLVANIA. FINAL REPORT

y Fisher; Eidemiller; Biche

Ultrasystems, Inc.

971 318p

Contract FH-11-7525

Report no. US-81202-2

Report for Jun 1970-Aug 1971.

This study was conducted to determine the in-use condition of automobiles in states with periodic motor vehicle inspection as compared with those in states with random motor vehicle inspection. Pennsylvania, New Jersey, and Washington, D.C. were used as the PMVI areas with California as the random inspection area. Data were collected from diagnostic centers. Criteria for selection of the centers were developed. Also, standard component test criteria were developed for evaluating tested components as being in a "pass" or "defective" condition. It was concluded that the three areas studied which had periodic motor vehicle inspection showed vehicles in significantly better condition than the vehicles in the random inspection state. Data processing for each file group considered three variables: vehicle age, vehicle mileage, and vehicle model year. The Pennsylvania statistics are given.

Search terms: Used automobiles; Vehicle inspection; Pennsylvania; New Jersey; District of Columbia; California; Data acquisition; Defective vehicles; Automobile defects; Diagnostic centers; Vehicle mileage; Vehicle age; Date of manufacture; Variables; Histograms; Statistical analysis; Computer programs; Vehicle safety standards

AVAILABILITY: NTIS

HS-800 607 Fld. 3/1; 4/1

THE DRINKING DRIVER:  
GUIDELINES FOR COURT  
PERSONNEL. FINAL REPORT

by Kent B. Joscelyn; Roger P. Maickel;  
Donald M. Goldenbaum

Indiana Univ.

1971 107p 20refs

Contract FH-11-7580

Report no. FH-11-7580-71-1; PB-208  
453

Report for 1 Jul 1970-30 Sep 1971.

A series of recommendations for the use of all court personnel and treatment agencies interested in devising improved methods of handling drinking drivers is presented. It deals with all phases of the interaction between drinking drivers, courts, and treatment agencies: pre-adjudication; prosecution, arraignment, trial, pre-sentence investigation, choice of penalty, imposition of sanction, referral to treatment, monitoring, follow-up, and evaluation of treatment referrals. Its objective is to establish basic principles and outline alternative choices by means of which courts may design effective procedures suited to their own needs and resources.

Search terms: Drinking drivers; Legal factors; Court decisions; Alcoholism; Alcohol usage deterrents; Disulfiram; Penalties; Psychological tests; Questionnaires; Driver rehabilitation; Problem drivers; Traffic courts

AVAILABILITY: NTIS as PB-208  
453

HS-800 608 Fld. 3/1; 4/1

THE DRINKING DRIVER: A  
SURVEY OF THE LITERATURE.  
COURT PROCEDURES SURVEY;  
REFERENCE VOL. 1. FINAL  
REPORT

by Kent B. Joscelyn; Roger P. Maickel;  
Donald M. Goldenbaum

Indiana Univ.

1971 115p refs

Contract FH-11-7580

Report no. FH-11-7580-71-2; PB-208  
454

Report for 1 Jul 1970-30 Sep 1971.

This survey of publications on both legal and medical procedures for handling problem drinking drivers is organized under several headings: the characteristics of the problem drinking driver, identification and screening procedures and tests, treatment approaches and facilities, and court referral programs. The survey concludes that, while researchers show general agreement as to the characteristics of the problem drinking driver, there is no single authoritative, proven method of distinguishing him from other kinds of drinking drivers. Therefore, both court referral programs and treatment programs tend to use the same procedures for both problem drinking drivers and chronic alcoholics, whereas the two categories are not the same. Further, the literature shows that no treatment or procedure has yet been shown to be conclusively superior either in changing the driving habits of the problem drinking driver or in reducing rates of recidivism for DWI.

Search terms: Drinking drivers; Legal factors; Reviews; Problem drivers; Alcohol usage deterrents; Driver rehabilitation; Alcoholism; Driver characteristics; Psychological tests; Traffic court cooperation with other agencies; Traffic courts

AVAILABILITY: NTIS as PB-208  
454

HS-800 609 Fld. 3/1; 4/1

**THE DRINKING DRIVER: A SURVEY OF LEGAL ISSUES. COURT PROCEDURES SURVEY; REFERENCE VOL. 2. FINAL REPORT**

by Kent B. Joscelyn; Roger P. Maickel; Donald M. Goldenbaum

Indiana Univ.

1971 89p refs

Contract FH-11-7580

Report no. FH-11-7580-71-3; PB-208 455

Report for 1 Jul 1970-30 Sep 1971.

The legal issues involved in handling the drinking driver are described and discussed in the light of the findings of a review of relevant legal cases, statutes, and books and articles. The generation of laws against drunk-driving, chemical tests and implied consent laws, statutory sanctions, and other legal constraints and possibilities are discussed. Also included are the issues involved in law enforcement (including the identifying and stopping of drinking drivers), procedures for pre-arrest investigation, arrest, giving of chemical tests, pre-trial, and at trial (including plea-bargaining and civil commitment). A discussion of sanction alternatives and the methods of imposing suitable sanctions is followed by a summary of the issues of civil liability in court referral programs. The conclusion reached by the survey is that referral to treatment as a condition of probation is the most effective present method for the courts to handle the problem drinking driver, and the alternative of civil commitment is recommended for the handling of chronic alcoholics.

Search terms: Drinking drivers; Legal factors; Problem drivers; Reviews; Penalties; Driver rehabilitation; Alcohol laws; Police law enforcement responsibilities; Alcohol chemical tests; Driver intoxication; Arrest procedures; Legal rights; Driver prosecution; State laws; Traffic courts;

Traffic court cooperation with other agencies;

AVAILABILITY: NTIS as PB-208 455

HS-800 610 Fld. 3/1; 4/1

**THE DRINKING DRIVER: A SURVEY OF CURRENT COURT PRACTICES. COURT PROCEDURES SURVEY; REFERENCE VOL. 3. FINAL REPORT**

by Kent B. Joscelyn; Roger P. Maickel; Donald M. Goldenbaum

Indiana Univ.

1971 120p

Contract FH-11-7580

Report no. FH-11-7580-71-4; PB-208 456

Report for 1 Jul 1970-30 Sep 1971.

Results of a nationwide survey of court and treatment agency practices for handling problem drinking drivers are presented and discussed. Mail survey results are supplemented by a more detailed description of practices at twelve operating court referral systems visited. It was determined that few courts and correspondingly few treatment agencies reported receiving such referrals. Few records were kept on treatment outcomes, including those involving the use of Antabuse.

Search terms: Drinking drivers; Legal factors; Driver rehabilitation; Traffic court cooperation with other agencies; Problem drivers; Surveys; Questionnaires; Court decisions; Driver intoxication; Disulfiram

AVAILABILITY: NTIS as PB-208 456

HS-800 611 Fld. 3/1; 4/1

**THE DRINKING DRIVER: A SURVEY OF TREATMENT ALTERNATIVES. COURT PROCEDURES SURVEY; REFERENCE VOL. 4. FINAL REPORT**

by Kent B. Joscelyn; Roger P. Maickel; Donald M. Goldenbaum

Indiana Univ.

1971 71p 116refs

Contract FH-11-7580

Report no. FH-11-7580-71-5; PB-208 457

Report for 1 Jul 1970-30 Sep 1971.

A review of publications dealing with different approaches to the treatment to problem drinking shows that there is as yet no single method demonstrably superior in effectiveness. The principal treatment approaches are psychotherapy, indirect pharmacotherapy, direct pharmacotherapy, and combination therapy. Of these, the last seems to be the most viable alternative, although complex to administer. Most treatment approaches have been evaluated only from the viewpoint of their relevance to alcoholics, and there has been no investigation of their efficacy for the problem drinking driver who is not an alcoholic. Recommendations for further research include more thorough investigation of the possibilities of Antabuse, exploration for drugs that would decrease the craving for alcohol, and further evaluation of combination therapy.

Search terms: Drinking drivers; Legal factors; Problem drivers; Traffic court cooperation with other agencies; Alcoholism; Psychotherapy; Drugs; Program evaluation; Disulfiram; Medical treatment; Reviews

AVAILABILITY: NTIS as PB-208 457

**NHTSA Contractors Reports  
(Cont'd.)****HS-800 612** Fld. 3/1; 4/1**A SURVEY OF COURT PROCEDURES FOR HANDLING PROBLEM DRINKERS CONVICTED OF DRIVING WHILE INTOXICATED. SUMMARY. FINAL REPORT**by Kent B. Joscelyn; Roger P. Maickel;  
Donald M. Goldenbaum

Indiana Univ.

1971 27p

Contract FH-11-7580

Report no. FH-11-7580-71-6; PB-208  
458

Report for 1 Jul 1970-30 Sep 1971.

This summary is intended to present in capsule form the background and contents of the five companion volumes surveying court procedures for handling problem drinking drivers. The following points are concentrated on: the methodology used to conduct the survey; the subject-matter generated by all survey activities; the conclusions reached; and recommendations made.

Search terms: Drinking drivers; Legal factors; Problem drivers; Surveys; Traffic court cooperation with other agencies; Alcohol education; Medical treatment

**AVAILABILITY:** NTIS as PB-208  
458**HS-800 621** Fld. 4/5; 1/3**DEVELOPMENT OF A COMPUTER PROGRAM TO AID THE INVESTIGATION OF HIGHWAY ACCIDENTS. INTERIM TECHNICAL REPORT**

by Raymond R. McHenry

Cornell Aeronautical Lab., Inc.

1971 106p 15refs

Contract FH-11-7526

Report no. CAL-VJ-2979-V-1

Report for Jun 1970-Dec 1971.

A computer program and an associated optical measurement system are described which have been developed to aid the investigation of highway accidents. The described developments constitute the major components of a system which will provide a capability of processing and evaluating data, via radio contact with the operator of a time-sharing computer terminal, while the investigators are at the accident scene. Reconstruction produced by the computer program is compared with the results of staged collisions in the literature. The instrumented optical system is described in detail, and results of trial applications are discussed. Plans for completion and evaluation of the overall system, which could not be implemented within the first year of effort, are presented and discussed.

Search terms: Computer programs; Accident investigation; Data processing; Accident reconstruction; Time sharing; Radio communication; Accident simulation; Accident research; Computerized simulation; Vehicle trajectories; Measuring instruments; Optical detectors; Mathematical models; Collision models; Impact tests; Damage patterns; Kinematics; Mathematical analysis

**AVAILABILITY:** NTIS**HS-800 639** Fld. 2/11**TRAFFIC RECORDS SURVEY OF LOCAL GOVERNMENT AGENCIES. FINAL REPORT**

Safety Management Inst.

1972 60p 9refs

Contract HS-021-1-182

The purpose of this survey was to describe the traffic record files main-

tained by representative sub-state governmental entities and to identify the data elements in each of these files. Thirty cities and counties were selected and inventoried, with selection based on geographic representativeness and the existence of automated records. The compiled results, complementing previous inventories of state, federal, and private industry records, enhance the National Highway Traffic Safety Administration's capability to locate data needed for research. Records were surveyed on subjects dealing with accidents, drivers, vehicles, and enforcement. The questionnaire used in the survey is included.

Search terms: Traffic records; Local government; Surveys; Driver records; Accident records; Data acquisition; Vehicle registration; Vehicle inspection; Law enforcement; Computerized records management; Police reports; Traffic courts; Questionnaires; Information systems

**AVAILABILITY:** NTIS**HS-800 660** Fld. 3/6**MEDICAL ADVISORY BOARDS**National Com. on Uniform Traf. Laws  
and OrdinancesPublished as *Traffic Laws Commentary*  
v1 n1 (Mar 1972)

33p refs

Contract DOT-HS-107-1-153

Twenty-five states have established medical advisory boards without laws specifically directing their creation. Sixteen states have adopted laws expressly providing for the creation of medical advisory boards. Although 12 of these 16 state laws specify that their boards will advise the department of motor vehicles with respect either to standards for licensing all drivers, or to the qualifications of particular drivers, only seven specify both functions, as does the

Uniform Vehicle Code. There are four states which, unlike the Uniform Vehicle Code and other states, provide for a medical advisory board review of department of motor vehicle decisions, and three of these may overrule such decisions. The Uniform Vehicle Code and the laws of eight states provide for a medical advisory board evaluation of any licensed driver or license applicant at any time when there is reason to believe that the individual may not be physically or mentally qualified, but this evaluation is limited in five other states.

Search terms: Medical advisory boards; Uniform Vehicle Code; State laws; Driver licensing

**AVAILABILITY:** GPO \$0.35

#### NHTSA Imprints

HS-820 186 Fld. 5/17

#### MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS FROM JANUARY 1, 1971 TO DECEMBER 31, 1971 REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS

National Hwy. Traf. Safety Administration

1972 60p

This tabulation of safety defect recall campaigns includes the make and model, model year, description of the defect requiring manufacturer's corrective action, number of vehicles recalled, date of notification and identification number. Automobiles, trucks, school buses, trailers, and tractors are included.

Search terms: Automobile recall campaigns; Truck recall campaigns; Trailer recall campaigns; Tractor recall campaigns; School bus recall campaigns; Defect correction; Defective vehicles; Statistics

**AVAILABILITY:** NHTSA

HS-820 199 Fld. 3/2; 5/14

#### OCCUPANT MOTION SENSORS

by Joseph L. Horner

Department of Transp., Transp. Systems Center

1971 57p 8refs  
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PB-204 808

An analysis has been made of methods for measuring vehicle occupant motion during crash or impact conditions. The purpose of the measurements is to evaluate restraint system performance using human, anthropometric dummy, or animal occupants. A detailed Fourier frequency analysis is made of the sensor requirements. Potential candidate systems of the following types are evaluated: mechanical, optical, electromagnetic (high frequency), ultrasonic or acoustic, and electromagnetic (low frequency). Recommended for further development and field testing are: rotational accelerometers; potentiometers; linear velocity transducers; radio direction finding systems; and ellipsometry.

Search terms: Restraint system effectiveness; Mathematical models; Fourier analysis; Systems analysis; Potentiometers; Optical detectors; Ellipsometers; Accelerometers; Occupant kinetics; Occupant kinematics; Motion sensors; Measuring instruments; Direction finding equipment; Transducers

**AVAILABILITY:** NTIS as PB-204 808

# U.S. DEPARTMENT OF TRANSPORTATION

## NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Research Institute, Office of Accident Investigation and Data Analysis

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